GENERAL ISSUE PAPER

San Francisco Bay Region Wastewater Solids Study

APPROVED BY WASTEWATER SOLIDS STUDY POLICY BOARD, STAFF REVIEW COMMITTEE, AND SUBREGIONAL AGENCY ADVISORY COMMITTEE ON MAY 9, 1977

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Sewage sludge -- CA -- SF metro area

Prepared Jointly by the San Francisco Bay Region Wastewater Solids Study and U.S. Environmental Protection Agency, Region IX

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WASTEWATER SOLIDS STUDY

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I. BACKGROUND

A. PURPOSE OF THE ISSUE PAPER

The purpose of this Issue Paper is to identify the general environmental and related issues to be addressed in the Environmental Impact Statement (EIS). Other site-specific issues will be included and identified by the Wastewater Solids Study, EIS consultant, affected governmental agencies, and the public during preparation of the 201 facilities plans.

An EIS is required by the U.S. Environmental Protection Agency (EPA) in compliance with the National Environmental Policy Act of 1969 (NEPA). The EIS is being prepared jointly by the San Francisco Bay Region Wastewater Solids Study (WSS) and EPA in accordance with a Memorandum of Understanding between EPA and the lead agency, East Bay Municipal Utility District (EBMUD).

B. GENERAL PROBLEM

Sludge is the most serious dilemma we face in wastewater treatment. It's Catch 22. The cleaner we make the water, the more sludge we create.

Cleaner water, an end desired by everyone, inevitably means more sludge as higher levels of treatment are accomplished. Next year there will be more sludge and the year after, still more. Municipalities of all sizes are increasing their level of wastewater treatment to comply with the Federal Water Pollution Control Act (FWPCA--P.L. 92-500).

The cost of sludge management is about one-half the operating cost of many wastewater treatment systems. Therefore, municipalities have a keen financial interest in finding ways to dispose of,

or use, sludge in economically and environmentally sound ways. Large metropolitan areas are especially hard pressed to find an answer which must be acceptable not only within their own jurisdictions but in neighboring ones as well.

Most communities dispose of their wastewater sludge in the least troublesome way. Cities barge their sludge out to sea, bury it in landfills, or burn it in incinerators and landfill the ash. Now, converging forces--environmental legislation, escalating costs, and greater concern about safeguarding the oceans, air quality, and water supplies--are causing communities to improve present sludge disposal methods.

We can continue to consider this sludge a waste product to get rid of, or we can consider it a resource and use it. In either case, it is important to avoid creating yet another environmental problem. The number of disposal/use alternatives for the final sludge end product is limited:

1. Landfill
2. Dedicated Land Disposal/Reclamation
3. Agricultural Land Application:
   - Food Chain;
   - Non-Food Chain; (golf courses, parks, silviculture)
4. Marketing:
   - Home and Garden; (packaged product)
   - Specialty (landscaping, municipal parks, bulk use)

C. THE BAY REGION PROBLEM

The Bay Region will generate about 1,000 tons per day of raw sludge by 1985 from 70 wastewater treatment agencies (Figure 1). That amount would cover a football field about one-half foot high everyday. The impact of the increased wastewater solids on most existing wastewater treatment facilities is beyond their present capabilities.

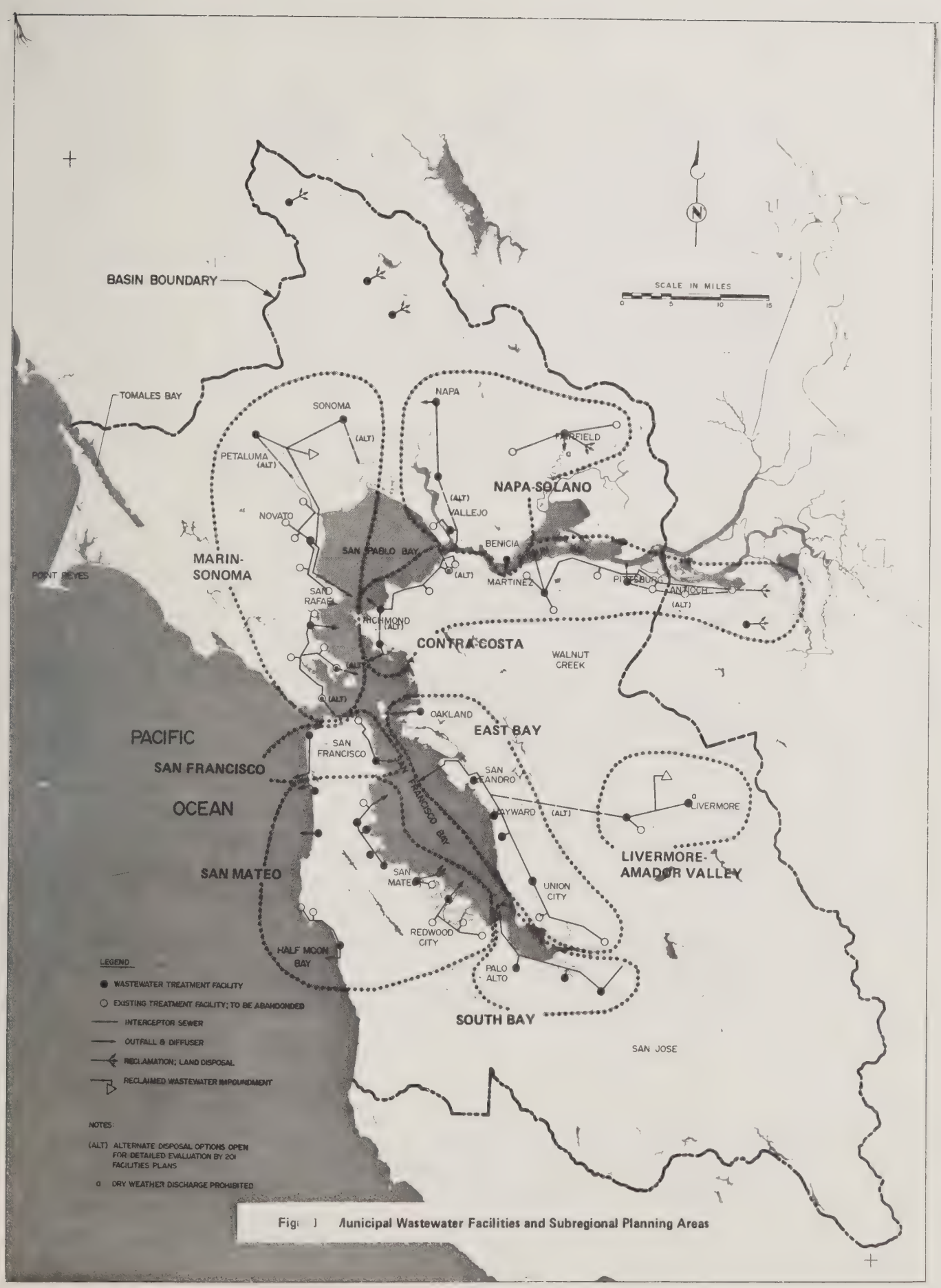

Fig. 1 Municipal Wastewater Facilities and Subregional Planning Areas

Wastewater solids in the study area are processed in the majority of municipal treatment plants by anaerobic digestion and dewatering, but few plants use incineration facilities for reduction of the sludge volume. Currently, about 75% of the digested and dewatered sludge is disposed of in landfills. At several of the smaller treatment plants air dried sludge is used as a soil conditioner by the public or by commercial enterprises. Lagooning is also used at a number of treatment plants for biodegradation, evaporative drying, and digested sludge storage. About 10% of the sludge is currently incinerated.

Wastewater solids planning in the Bay Region has been done primarily on a local level. The need for regional planning has been identified because:

1. Local planning for wastewater solids management addresses only immediate needs; is not coordinated throughout the Region, and may not be cost-effective or environmentally sound on a regional level.

2. Firm strategy and long-range policy regarding wastewater solids management are not well defined in existing regional and subregional wastewater and municipal solid waste planning efforts.

3. A need exists to coordinate wastewater solids management with other related solids management problems, including industrial waste products, municipal solid waste, and water treatment solids.

4. A regional study of wastewater solids management offers a broad-based evaluation of options and can provide facilities planning criteria not available on a local basis.

D. THE STUDY

The four largest wastewater treatment agencies in the Bay Region--the City and County of San Francisco, the City of San Jose, Central

Contra Costa Sanitary District, and the East Bay Municipal Utility District--formed a joint powers agency in February, 1976, to find a long-term solution. The $1.8 million, 3-year Study is funded under Section 201 of P.L. 92-500. Design and construction of recommended facilities will follow. The WSS Plan will become a part of the Solid Waste portion of ABAG's "208" Environmental Management Plan.

The *goals* of the Study are:

1. To develop a regional policy and plan for long-term municipal wastewater solids management needs in the nine-county San Francisco Bay Region; and

2. To develop staged facilities plans for the four major wastewater treatment agencies as necessary to implement the regional policy and plan and in conformance with EPA and SWRCB Step 1 grant requirements, NEPA and CEQA requirements, and consistent with the ABAG 208 Environmental Management Plan.

Major *objectives* to be accomplished *during the Study* are:

1. Public involvement in evaluating wastewater solids management options during all phases of the Study.

2. Evaluate the economic, environmental, and social impacts associated with continuing the present methods of municipal wastewater solids management in the region--the "No Project Alternative."

3. Evaluate immediate municipal wastewater solids management needs and facilities plans. Plans to solve immediate water quality and solids disposal problems should not be delayed. But such plans should minimize capital expenditures except when the plans lead to long-range solutions.

4. Develop broad-based facilities planning information for use by subregional and local agencies.

5. Evaluate opportunities for joint regional wastewater solids facilities.

6. Coordinate wastewater solids planning with municipal solid waste, and compatible industrial wastes and water treatment solids.

7. Coordinate regional regulatory requirements.

8. Develop an implementation schedule for the facilities plans, including timetables for the design and construction phases.

9. Recommend institutional, financial, and legal procedures for implementing the recommended design and construction phases of work to meet the proposed implementation schedule.

10. Prepare a final Project Report and Environmental Impact Statement in accordance with SWRCB, NEPA, and CEQA requirements in such a manner that it would serve as a reference document for local programs.

11. Integrate the regional wastewater solids management plan into the ABAG "208" Environmental Management Plan.

12. Projects recommended for implementation should:

    - Minimize adverse environmental impacts.
    - Minimize capital and operating costs.
    - Minimize energy requirements.
    - Provide operational reliability and backup systems.
    - Provide flexibility to adapt to changing situations.
    - Use the wastewater solids for beneficial purposes where possible.

II. GENERAL ISSUES

A. DISPOSAL OR USE?

Is wastewater sludge a resource or hazardous waste? Should it continue to be disposed of in landfill sites and burned in incinerators or should it be used as an organic fertilizer and

soil conditioner by the general public and in commercial agriculture?

1. Fertilizer Value. Sewage sludge is not the perfect fertilizer. As a source of three primary plant foods, nitrogen, phosphorus, and potassium, sewage sludge has some disadvantages. Being a slow-release fertilizer, it may not make enough nitrogen available for a rapidly growing, short-season crop. But sewage sludge does contain enough of these three elements in usuable form to replace commercial fertilizers for such crops as corn, grain, soybeans, and alfalfa, though in some cases additional potassium may be required.

   The higher the price and lack of availability of fossil fuels used in the manufacture of commercial fertilizers, the more valuable the sludge becomes as a fertilizer. Since the nutrient content of sewage sludge is lower than that of commercial fertilizers, sludge-based fertilizer must be used close to its source, or its dollar value as fertilizer will be offset by the cost of transportation.

2. Soil Conditioner Value. Dried or composted sewage sludge is an excellent conditioner for soils lacking organic matter (sand) and tight or heavy clay soils. It can improve the aeration and water penetration, water retention and provide humus for such soils. Sludge-based soil conditioning products are available on the market today but marketing of readily available high quality, reliable sludge products has not been attempted by many wastewater agencies in conjunction with an overall marketing strategy.

B. HEALTH CONSIDERATIONS

What are the health risks associated with the use of wastewater sludge by the general public and in commercial agriculture? Is it a hazardous waste?

1. Pathogens. Possible danger from pathogenic bacteria, viruses and parasites is an obstacle to the use of wastewater sludges on cropland and by the general public. Pathogens might be a health risk directly to farm workers and indirectly to the public through the food chain. The degree of risk depends on the processing of the sludge and how it is used. Experiences with use of sludge suggests that the risk is low and that utilization of sewage sludges is probably impeded to a greater extent by the fear of disease than by the actual disease hazard involved.

   EPA--as of June 1976--says, "The relative risks of applying wastewater sludges to food crops, when compared to other routes through which these contaminants enter the human diet, have yet to be determined. Even though stabilization methods are used, additional precautions should be taken when sludge is used for agricultural purposes...Application methods are encouraged that prevent direct contact of the sludge and the crop to be consumed...Forage and pasture crops should not be permitted on pastures before thorough removal of sludge, by rain or some similar method."

   The California Department of Health says that wastewater sludge should receive treatment equivalent to composting to assure its safe use.

2. Heavy Metals. Many of the objections to the use of wastewater sludge on cropland is the possibility of danger from heavy metals. Zinc, copper, nickel, and cadmium are the elements of most concern. All are toxic to animals and man; particularly cadmium. Critics ask if, after long years of application of sewage sludges, these heavy metals will build up in soils and be released at levels toxic to crops and in turn to animals and man.

   Research is needed to evaluate cumulative effects. The WSS Solano County Soil Enrichment Study is developing information on

toxicity of heavy metals to plants. In general, the results to date indicate that the toxicity problem is not as severe as was once thought, especially if care is taken in site selection and if sound management programs are followed. Source control of heavy metals prior to discharge into wastewater collection systems is one element of a sound management program.

During the development of EPA's Technical Bulletin, Municipal Sludge Management (1975), considerable disagreement surfaced on the topic of utilizing sewage sludges by the public and application to agricultural lands. Although utilization of sewage sludges as a resource to recover nutrients and other benefits has been encouraged by P.L. 92-500 and the EPA Science Advisory Board, the workgroup members and others involved in developing this Technical Bulletin have received conflicting opinions concerning the overall merits vs. hazards of applying sludges to cropland. Possible adverse effects upon the human food chain...has remained a major concern expressed whenever this practice is considered.

The California Department of Health is developing regulations to control the use of sludge. The same issues confronting EPA are being addressed by the Department of Health in cooperation with the WSS.

C. PUBLIC ACCEPTANCE

Resistance to the use of wastewater sludge is common. Metropolitan areas with large amounts of sludge meet opposition when they propose that surrounding agricultural areas use city sludge. Such suggestions are often perceived as an attempt by cities to foist urban wastes on the unsullied countryside. For example, when the Denver Sewage Disposal District No. 1 announced plans for an agricultural sludge reuse program in the rural part of adjacent Adams County, farmers and other citizens accused Denver of using Adams County as a dumping ground--even though for several years the District had been successfully using both dried and liquid sludge

to grow crops and grasses on a former bombing range. Chicago is being sued by residents of Fulton County, Illinois, as a result of its agricultural reuse program.

A public participation program is being conducted by the WSS to develop a mutual understanding of wastewater solids management problems and solutions with the participating agencies, citizens, political and institutional interests. The goal is to produce a plan acceptable to the participating agencies with widespread public understanding and acceptance.

The public is more likely to accept a project they understand and understand a project they helped develop.

D. FINANCIAL COST AND INSTITUTIONAL CONSIDERATIONS

No matter which sludge management options emerge as economical and environmental sound, important questions must be asked--how much will the solutions cost? Who will pay? How will the solutions be implemented? Who will be responsible?

1. Financial Cost Considerations. Short-term and long-term financing requirements for the various processing, transportation, and disposal/use alternatives will be evaluated. Capital and operating costs for each alternative will be presented in the WSS analysis as well as expected revenues as applicable to utilization projects.

   Opportunities for combinations of public and private financing will be considered along with the use of Federal "201" construction grant monies (87.5% Federal and State share). This naturally includes an evaluation of impact of monetary costs on the local taxpayer for each potential sludge management solution. These costs could mean increased sewer service charges. An equitable revenue program for each facilities plan will be developed.

2. Institutional Considerations. The impact of the project implementation process will be evaluated as affected by public acceptance

factors, political feasibility, jurisdictional feasibility, existing and related planning activities, legislation, and consistency with existing regulations and policies.

Institutional requirements for combinations of public-private operations and combinations of wastewater agencies for joint projects will be determined. Legislative, organization, and contractual needs of each alternative will be identified and discussed.

E. ENVIRONMENTAL CONSIDERATIONS

Progress has been made in the Bay Region toward solving various environmental problems including air quality, water quality, and solid waste management. A goal of the WSS is to promote continued progress and to recommend sludge management projects that are environmentally sound.

Major environmental considerations will include:

1. Air Quality and Odor. Federal, State and regional air quality standards will be used to evaluate the air quality impacts associated with process, transport, disposal/use alternatives.

2. Water Quality. Wastewater solids processes that are completely contained within a treatment plant may affect the quality of wastewater effluent but their impact is normally not significant with respect to water quality. Significant impacts associated with disposal/use project sites will be evaluated.

   The effect of proposed projects on "beneficial water uses" as defined by the Water Quality Management Plan for the Bay Region will be examined for all surface-water and groundwater resources that may be affected.

3. Land Resources. Since ocean disposal is not presently allowed by Federal and State regulations, all processed sludge eventually is returned to the land. Land resources would be affected by land-oriented projects, e.g., landfill, dedicated land disposal/

reclamation, agricultural land spreading. Basic land-related concerns will be addressed.

F. SOCIAL CONSIDERATIONS

It is anticipated that except for very special cases, recommended sludge management solutions will have minimal impact on such social concerns as; housing supply, economic activity, physical mobility, sense of community, urban land use patterns, growth inducement and equity. However, all of these considerations will be fully addressed for proposed projects.

G. ENERGY CONSIDERATIONS

Proposed projects will have an effect on energy supply, demand, and conservation. Energy issues will be fully addressed.

Sewage sludges can be net consumers or net suppliers of energy, depending on their use and management. Dry sludge solids have a relatively high heat value, but energy must be applied to drive off the water in the sludge and bring it to the combustion point. Dehydration of sludge with fossil fuels consumes energy, but dehydration with energy from the sun does not. Sludge treatment processes generally consume energy but some can actually produce energy.

Bioconversion of sludge into methane is one process that produces energy. For decades, methane gas formed during sludge digestion has been used to heat digesters and perform other work. Due to the cheap cost of energy in the past, it has not seemed important to develop widespread methane gas utilization projects, but expansion of this proven technology is one way to offset the increasing cost and shortage of natural gas.

Energy can also be produced by mixing municipal solid waste and sludge. The solid waste can provide the fuel (refuse derived fuel) and with heat recovery, starved air incineration and